

ABSTRACT OF THE DISCLOSURE

A multiplex structure, such as a nucleic acid quadruplex, includes: a first strand containing a first sequence of nucleobases; a second strand containing a second sequence of nucleobases, wherein the second strand is associated with the first strand by Watson-Crick bonding; a third strand containing a third sequence of nucleobases; and a fourth strand containing a fourth sequence of nucleobases, wherein the fourth strand is associated with the second strand and the third strand by Watson-Crick bonding. Formation of the multiplex structure is promoted by monovalent cations (e.g., sodium and potassium), divalent cations, multivalent cations, intercalating agents and/or molecules known to bind within the minor grooves of nucleic acids. The multiplex structure and the process of forming it have diagnostic, therapeutic, prophylactic and nanoengineering applications.